# ASTRONOMICAL SOCIETY OF LONDON.

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A LETTER was read from Major Hodgson, the Surveyor-General of India, dated from Calcutta, April 18, 1827, accompanied by two copious lists of astronomical observations. The *first* contained a series of transits of the moon and some of the principal fixed stars, as observed at his own house (situated 5 seconds in time, east of the Flag-staff of Fort William) from November 18, 1826, to March 20, 1827, both inclusive. The observations are above 300 in number; and the stars observed are not those which are usually denominated moon-culminating stars, but consist of some of the principal stars only; and many of these situated occasionally at very considerable distances from the moon in declination. In fact, the list of moon-culminating stars has never yet been computed early enough, to enable it to be sent to such distant places, in sufficient time for the observations. It is therefore to be feared that correspondent observations of many of the stars observed by Major Hodgson may not be found at the observatories in Europe. The results of the transits are regularly computed by Major Hodgson, agreeably to a printed form, where every step of the process is minutely laid down, and of which he has forwarded to the Society two examples. It is Major Hodgson's intention to continue his observations for one whole year at least, and to transmit them to the Society, together with the daily computations shewing the results. The instrument employed was a 31-inch transit by Dollond; but he is in expectation of a more powerful one shortly from England. The *second* list contained a series of upwards of 200 observations of the eclipses of Jupiter's satellites, taken by gentlemen in the civil service, and by officers of the Bengal army, at different times and at different places. The dates extend from July 18, 1795, to April 11, 1827; and the names of the observers are given, together with the length, the aperture, and the magnifying power of the telescope employed. Major Hodgson states that he shall transmit several others as soon as he can collect them; for (he observes) "observations of this kind have been of much use in determining geographical positions in this widely extended country; and the probability of obtaining correspondent observations through the medium of the Astronomical Society, will excite travellers and surveyors to take advantage of all opportunities of making observations of the eclipses of the satellites of Jupiter, and of the culmination of the moon and stars."

A paper was also read, entitled "On the computation of the geocentric places of the planets for ephemerides:" by J. F. Littrow.

The usual mode of computing the geocentric places of the planets for ephemerides consists in instituting a first computation of their heliocentric positions, which are then reduced to geocentric, by well known formulæ. To avoid the very laborious calculations entailed by this process, Prof. Gauss devised a method much more expeditious, and which gives at once the geocentric right ascensions and declinations, as well as the distance of the planet from the earth, in terms of the co-ordinates of the earth and planets at the instant of observation. The equations expressive of these relations are stated by M. Littrow, and are extremely simple. By them, the right ascension ($\alpha$), the declination ($\delta$), and mutual distance ($\varrho$) are given directly as follows:

$$\tan \alpha = \frac{Y + y}{X + x}$$

$$\tan \delta = \frac{Z + z}{X + x} \cdot \cos \alpha \qquad \text{(I)}$$

$$\varrho = \frac{Z + z}{\sin \delta}$$

X, Y, Z being the co-ordinates of the earth, and $x$, $y$, $z$ of the planet.

Now it is obvious, that if we neglect the perturbations (on which neglect, it will be observed, the application of this method mainly depends), all these co-ordinates are, ultimately, functions respectively of the mean longitudes of the earth and planet, and their values may therefore be tabulated as such; and the tables, once constructed, will last till the secular variations of the elements of the planetary orbits shall have so changed them as to produce an error surpassing that which can be tolerated in an ephemeris. These tables once computed, the foregoing equations reduce the annual computations to the utmost brevity. The only point then to consider is the construction of the tables themselves.

The expressions of the co-ordinates in terms of the mean longitude are made to depend on the true longitude as the independent variable, by means of six constant quantities for each planet. These are, 1st, the respective inclinations of the plane of the planet's orbit to the solstitial and equinoctial colures and the earth's equator; and, 2ndly, the plane angles made by the line of intersection of the planet's orbit, and the ecliptic respectively with its line of intersection with the solstitial and equinoctial colures and equator. The author states the method of computing these constants from the known elements of the orbit, and gives their actual numerical values for all the planets, with their secular variations. These once known, and the true longitude, as a preliminary step, computed for every mean longitude, he states the equations by which the co-ordinates are formed from them for every given value of the longitudes; and, finally, embodies the whole result of his computations in a table stating their values for each of the planets, and for intervals of 4° for Mercury and Venus, 3° for Mars, 2° for Jupiter, Saturn, and Uranus, and for each day in the year for the Sun.

The publication of the 1st Part of the 3d Volume of the Memoirs of the Society was announced by the President.

At the conclusion of the business of the evening, an instrument, contrived by Mr. Henry Atkinson, of Newcastle-upon-Tyne, to illustrate some of the phenomena of rotation, was submitted to the inspection of the members by Mr. Riddle. It consists of a flat circular disk, through the centre of which passes a small endless screw, having a cup in one of its extremities. When the cup is *below* the centre of gravity, and set on a point on which the disk (inclined to the horizon) is made to rotate in its own plane, the whole rotating plane performs at the same time a slow revolution round the perpendicular to the horizon, which passes through the point of rotation; and the revolution of the plane is in the *same* direction as the rotation. When the point of rotation is *above* the centre of gravity, the plane moves slowly round in a direction *contrary* to that of rotation, affording an apt *illustration* of *precession*. When the point of rotation is *in* the centre of gravity, the position of the revolving plane continues permanent.

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